

# Word Problems

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For questions in the Quantitative Comparison format (“Quantity A” and “Quantity B” given), the answer choices are always as follows:

- (A) Quantity A is greater.
- (B) Quantity B is greater.
- (C) The two quantities are equal.
- (D) The relationship cannot be determined from the information given.

For questions followed by a numeric entry box , you are to enter your own answer in the

box. For questions followed by fraction-style numeric entry boxes   
, you are to enter your answer in the form of a fraction. You are not required to reduce fractions. For example, if the answer is  $\frac{1}{4}$ , you may enter 25/100 or any equivalent fraction.

All numbers used are real numbers. All figures are assumed to lie in a plane unless otherwise indicated. Geometric figures are not necessarily drawn to scale. You should assume, however, that lines that appear to be straight are actually straight, points on a line are in the order shown, and all geometric objects are in the relative positions shown. Coordinate systems, such as  $xy$ -planes and number lines, as well as graphical data presentations such as bar charts, circle graphs, and line graphs, are drawn to scale. A symbol that appears more than once in a question has the same meaning throughout the question.

1. If a taxi charges \$8.00 for the first mile, and \$1.00 for each additional quarter mile, how much does the taxi charge for a 4.5 mile ride?
  - (A) \$16.00
  - (B) \$18.00
  - (C) \$22.00
  - (D) \$24.00
  - (E) \$26.00
2. If Nash had 12 grandchildren and three times as many granddaughters as grandsons, how many granddaughters did he have?
  - (A) 3
  - (B) 4
  - (C) 6
  - (D) 8
  - (E) 9
3. If Deepak pays 30% of his income in taxes and his take-home pay after taxes is \$2,800 per month, how much does Deepak make per month?

\$

4. Movie theater X charges \$6 per ticket, and each movie showing costs the theatre \$1,750. How many people need to see a movie so that the theater makes \$1 of profit per customer?
- (A) 300  
(B) 325  
(C) 350  
(D) 375  
(E) 400
5. Arnoldo earns \$11 for each ticket that he sells, and a bonus of \$2 per ticket for each ticket he sells over 100. If Arnoldo was paid \$2,400, how many tickets did he sell?
- (A) 120  
(B) 160  
(C) 180  
(D) 200  
(E) 250
6. Attendees at a charity dinner each gave at least \$85 to the charity. If \$6,450 was collected, what is the maximum number of people who could have attended?
- (A) 73  
(B) 74  
(C) 75  
(D) 76  
(E) 77
7. Eva meditates for 20 minutes at a time, with a 5-minute break in between sessions. If she begins meditating at 10:10, what time will it be when she completes her third session?
- (A) 11:20  
(B) 11:25  
(C) 11:50  
(D) 11:55  
(E) 12:25
8. A washing machine takes 35 minutes to wash one load of laundry, and in between washing different loads of laundry it takes Derek 2 minutes to unload and another 4 minutes to reload the machine. If the washing machine begins washing one load of laundry at 12:30pm, how many loads of laundry can Derek wash and unload before 6:35pm?
- (A) 8  
(B) 9  
(C) 10  
(D) 14  
(E) 15
- 9.

Kendra is more than 5 years old.

**Q uantity A**

**Q uantity B**

Five years less than twice Kendra's age

Twice what Kendra's age was  
five years ago

10.

Six years ago, Billy was twice as old as Allie.

**Q uantity A**

**Q uantity B**

The difference between their ages today

2 years

11. Every day the drama club has a car wash, the club pays a fixed amount for supplies. If the club charges \$12 for a car wash and earned a total profit of \$190 in one day by giving 20 car washes, how much did the club pay for supplies, assuming that there are no other expenses?

12. A store owner pays her assistant \$22 per hour for every hour the store is open. If all other expenses for the store work out to \$160 per day, and the store is open for 8 hours on Monday and sells \$720 worth of merchandise on that day, what is the store's profit for the day?

- (A) 384
- (B) 396
- (C) 530
- (D) 538
- (E) 560

13. Regular gas costs \$3.00 a gallon and is consumed at a rate of 25 miles per gallon. Premium costs \$4.00 a gallon and is consumed at a rate of 30 miles per gallon. How much more will it cost to use premium rather than regular for a 300-mile trip?

- (A) \$1
- (B) \$4
- (C) \$5
- (D) \$36
- (E) \$40

14. A toy retailer buys toys from the toy company and marks the price up 25% to sell to customers. If the retailer has a sale of 80% off retail price, what is its percent loss in terms of the original amount it paid for the toys?

- (A) 25%
- (B) 30%
- (C) 40%
- (D) 75%
- (E) 80%

15. Mr. Choudhury's fourth-grade class consists of 20 students: 12 boys and 8 girls. If the boys weigh an average of 80 pounds each, and the girls weigh an average of 70 pounds each, what is the average weight in pounds of all 20 students?

- (A ) 71
- (B ) 74
- (C ) 75
- (D ) 76
- (E) 79

16.It costs a certain bicycle factory \$11,000 to operate for one month,plus \$300 for each bicycle produced during the month.Each of the bicycles sells for a retail price of \$700.What is the minimum number of bicycles that the factory must sell in one month to make a profit?

- (A ) 26
- (B ) 27
- (C ) 28
- (D ) 29
- (E) 30

17.The yoga company Yoga for Life offers 45-minute classes at \$12 per class.If the number of minutes Randolph spent doing yoga this month was 132 greater than the number of dollars he paid,how many classes did he attend?

- (A ) 3
- (B ) 4
- (C ) 5
- (D ) 6
- (E) 8

18.When Mark fills his car with regular gasoline,he gets 20 miles/gallon.When he fills his car with premium gasoline,he gets 25 miles/gallon.If the price of regular gasoline is \$4.00 per gallon and the price of premium gas is \$6.25 per gallon,then the cost efficiency of regular gasoline,in miles/dollar,is what percent greater than the cost efficiency of premium gasoline?

- (A ) 4%
- (B ) 10%
- (C ) 20%
- (D ) 25%
- (E) 50%

19.An online merchant sells wine for \$20 a bottle or \$220 for a case of 12.Either way,his cost for the wine is \$10 per bottle.Shipping costs him \$5 for a bottle and \$40 for a case.If,in a month,he sells 12 cases and 60 bottles and has no other revenue or expenses,his profit is equal to which of the following?

- (A ) \$780
- (B ) \$1,020
- (C ) \$2,160
- (D ) \$2,640
- (E) \$3,840

20.If everyone who contributed to a charity drive paid at least \$14 and \$237 was collected,what is the maximum number of people who could have contributed?

- (A ) 13
- (B ) 14
- (C ) 15
- (D ) 16
- (E) 17

21.

In a certain barter system ,one sack of rice can be traded for two and a half chickens or a third of a medalion.

**Quantity A**

The value of a chicken in sacks of rice

**Quantity B**

The value of a medalion in sacks of rice

22.A hunting lodge has enough fuel to keep 20 rooms heated for fourteen days.If the lodge decides to save fuel by turning off the heat in 5 unoccupied rooms,and each room requires the same amount of fuel to heat it,how many extra FULL days will the fuel supply last?

- (A) 3
- (B) 4
- (C) 5
- (D) 18
- (E) 19

23.Last year,a magazine charged a \$50 subscription fee.This year,the price will be increased by \$10.If the magazine could lose 4 subscribers this year and still collect the same revenue as it did last year,how many subscribers did the magazine have last year?

- (A) 20
- (B) 21
- (C) 22
- (D) 23
- (E) 24

24.Store Y sells two brands of socks,one at \$3 a pair and the other at \$4 a pair.If Janine must spend exactly \$29 on socks and there is no sales tax,how many pairs of socks can she buy?

Indicate all such values:

- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10

## Word Problems Answers

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1.(C). Break the trip into two parts: the first  $m$  mile and the final 3.5 miles. The first  $m$  mile costs \$8, and the final 3.5 miles cost \$1 per  $\frac{1}{4}$  mile, or \$4 per mile.  $8 + 3.5(4) = 8 + 14 = 22$ .

2.(E). Rather than assigning separate variables to the granddaughters and grandsons, define them both in terms of the same unknown multiplier, based on the ratio given:

$$\text{Number of granddaughters} = 3m$$

$$\text{Number of grandsons} = m$$

Note that you are solving for  $3m$ , not simply for  $m$ !

$$3m + m = 12$$

$$4m = 12$$

$$m = 3$$

$$3m = 9$$

SHORTCUT: Another method depends on the same underlying logic, but forgoes the algebra. Suppose that Nash had exactly one grandson and three granddaughters. That would add to four grandchildren altogether. Triple the number of grandsons and granddaughters to triple the number of grandchildren.

Further, note that only (D) and (E) are greater than half of 12, and that 8 isn't a multiple of 3.

3.4,000. If Deepak pays 30% in taxes, his take-home pay after taxes is 70%. Since this amount is equal to \$2,800:

$$0.70x = 2,800$$

$$x = 4,000$$

4.(C). This problem requires you to know that profit equals revenue minus cost. You should memorize the formula Profit = Revenue - Cost (or Profit = Revenue - Expenses), but you could just think about it logically — of course a business has to pay its expenses out of the money it makes: the rest is profit.

The question tells you that the cost is \$1,750. If the theater charges \$6 per ticket, the revenue will be equal to 6 times the number of customers. Let  $c$  be the number of customers. The revenue is  $6c$ . Lastly, the question asks for the number of customers so that the profit is \$1 per customer. That means that the profit will be \$1 times the number of customers, or  $c$ . Plug these values into the equation Profit = Revenue - Cost:

$$c = 6c - 1750$$

$$-5c = -1750$$

$$c = 350$$

5.(D). Let  $x$  = the total number of tickets sold. Therefore,  $(x - 100)$  = the number of tickets Arnoldo sold beyond the first 100

$$11x + 2(x - 100) = 2,400$$

$$11x + 2x - 200 = 2,400$$

$$13x = 2,600$$

$$x = 200$$

6.(C ).Divide \$6,450 by \$85 to get 75.88... But don't just round up! You are told that each person gave at least \$85. If 76 people attended and each gave the minimum of \$85, then \$6,460 would have been collected. Since only \$6,450 was collected, that 76th person could not have attended. You need to round down to 75. (This means at least one person gave more than the minimum.)

7.(A ).Simply list Eva's meditation sessions and breaks:

10:10 - 10:30 session 1

10:30 - 10:35 break

10:35 - 10:55 session 2

10:55 - 11:00 break

11:00 - 11:20 session 3

Note that you are asked for the time when she completes her third session, so do not add a third break!

A quicker way to do this problem would be to add  $20(3) + 5(2)$  to get 70 minutes. 70 minutes after 10:10 is 11:20.

8.(B ).You *could* simply list Derek's activities:

12:30 - 1:05 load 1

1:05 - 1:11 unload/reload

1:11 - 1:46 load 2

1:46 - 1:52 unload/reload

1:52 - 2:27 load 3

Etc.

However, completing this rather tedious list all the way up to 6:35pm is not a good expenditure of time on the GRE. A better approach would be to determine how many minutes are available for Derek to do laundry. From 12:30 to 6:35 is 6 hours and 5 minutes, or 365 minutes. (Many students make silly mistakes here by calculating as though there were 100 rather than 60 minutes in an hour!)

It takes 41 minutes to do one load of laundry and then switch to the next one ( $34 + 4 + 2$  minutes).

Divide 365 minutes by 41 to get 8.9... So, Derek can definitely do 8 total loads of laundry plus switching time.

What about that extra 0.9...? You need to figure out whether Derek can fit in one more laundry load. Importantly, for this last load he needs only 2 extra minutes to unload, since he will not be reloading the machine.

Multiply 8 (the total number of loads Derek can definitely do) by 41 minutes to get 328 minutes. Subtract 328 from the 365 available minutes to get 37 minutes. Amazingly, that is *exactly* how much time it takes Derek to do one load of laundry (35 minutes) and then unload it (2 minutes). So, Derek can wash and unload 9 total loads of laundry.

9.(A ).This is an algebraic translation, meaning you need to translate the text into algebra. Use  $k$  to represent Kendra's

age, and you know  $k > 5$  (they only tell you this because Quantity B requires you to consider Kendra's age five years ago, and if she were younger than five years old, that would create an impossible negative age!).

Quantity A becomes  $2k - 5$ , while Quantity B becomes  $2(k - 5)$  or  $2k - 10$ . From here, the easiest thing is to manipulate the columns as if they were a giant inequality:

$$2k - 5 > 2k - 10$$

(The direction of the inequality sign in the center doesn't matter.)

The  $2k$  on either side cancels, and you're left with  $-5$  on the left and  $-10$  on the right.  $-5$  is bigger than  $-10$ , so Quantity A is bigger.

You could also solve this question by plugging in values, but there's no need, as the algebra is nice and simple. The answer is (A).

**10.(D).** This is an algebraic translation question, so you should start by translating the given information into algebra. Start by creating variables,  $A$  for Allie and  $B$  for Billy. Notice that the question is asking about six years ago, so you need to subtract six from both Billy and Allie's ages:

$$B - 6 = 2(A - 6)$$

$$B - 6 = 2A - 12$$

$$B = 2A - 6$$

That's as far as you can take the algebra. From here, Quantity A asks you for  $B - A$  (we know that Billy is older from the given information). You can't solve for that with the equation you've been given, so you should quickly look at some values:

$$B = 2A - 6$$

Notice that you can't pick whatever values you want here. You need both Billy and Allie to be older than 6, or else the issue of six years ago won't make a lot of sense (you don't want negative ages!). Start out with Allie at 7 years old. That would make Billy 8 years old.

$$8 - 7 = 1$$

In this case, Quantity B is bigger, so the answer has to be (B) or (D).

Because you've minimized  $A$  and  $B$ , you should try something big next. If  $A$  were 100,  $B$  would be 194.

$$B - A = 194 - 100 = 94$$

In this case, Quantity A is bigger, so the answer is (D).

**11.50.** Since Profit = Revenue - Expenses, and \$12 for a car wash multiplied by 20 car washes = \$240:

$$190 = 240 - E$$



Subtract 240 from each side, then multiply each side by -1 to flip the signs:

$$190 = 240 -$$

$$E - 50 = -E$$

$$50 = E$$

12.(A). Since Profit = Revenue - Expenses, and you are told that revenue = \$720:

$$P = 720 - E$$

Expenses are equal to \$22 per hour times 8 hours, plus a fixed \$160, or  $22(8) + 160 = \$336$ . Thus:

$$P = 720 - 336$$

$$P = 384$$

13.(B). 12 gallons of regular are needed to go 300 miles (300 divided by 25 miles per gallon), costing \$36 (12 gallons  $\times$  \$3 per gallon). 10 gallons of premium would be needed to go 300 miles (300 divided by 30 miles per gallon), costing \$40 (10 gallons  $\times$  \$4 per gallon). You need the difference, so  $\$40 - \$36 = \$4$ .

14.(D). For problems like this that ask for percents and use no real numbers, it is almost always easy and possible to use 100 as a starting number. Suppose the toy store buys the toys for \$100, and marks them up to \$125. An 80% sale will drop the price down to \$25. The percent loss is the amount it loses per toy expressed as a percentage of the original price per toy:

$$(100 - 25)/100 \times 100 = 75\%$$

15.(D). The most straightforward approach is to determine the total weight of all 20 students, and divide that total by 20.

$$12 \text{ boys} \times 80 \text{ pounds per boy} = 960$$

$$\text{pounds } 8 \text{ girls} \times 70 \text{ pounds per girl} =$$

$$560 \text{ pounds Total} = 1,520 \text{ pounds}$$

$$1520/20 = 76$$

SHORTCUT: Pretty much all GRE multiple-choice weighted average problems have the same five answers:

Much closer to the lesser value

A little closer to the lesser value

The unweighted average of the two values

A little closer to the greater value

Much closer to the greater value

Any of these five choices *could* be correct, but the correct answer is usually “a little closer to the lesser value” or “a little closer to the greater value.” In this case, because there are a few more boys than girls, the weighted average will be a little closer to the boys’ average than to the girls’.

16.(C). The question asks how many bicycles the factory must sell to make a profit. One way of phrasing that is to say

the profit must be greater than 0. Since Profit = Revenue - Cost, you can rewrite the equation to say:

$$\text{Revenue} - \text{Cost} > 0$$

Let  $b$  equal the number of bicycles sold. Each bike sells for \$700, so the total revenue is  $700b$ . The cost is equal to \$11,000 plus \$300 for every bicycle sold.

$$(700b) - (11,000 + 300b) > 0$$

Isolate  $b$  on one side of the inequality:

$$700b - 11,000 + 300b > 0$$

$$400b - 11,000 > 0$$

$$400b > 11,000$$

$$b > 27.5$$

If  $b$  must be greater than 27.5, then the factory needs to sell at least 28 bicycles to make a profit.

17. **(B)**. The normal way to do this problem would be to assign variables and set up equations, using  $X$  to represent the number of classes Randolph took,  $12X$  to represent the amount he paid, and  $45X$  to represent the number of minutes he spent.

A quicker way might be to notice that with every class Randolph takes, the difference between the number of minutes he spends and the amount he pays increases by 33. If Randolph takes 1 class, then the number of minutes he spends is 33 greater than the number of dollars he pays. If he takes 2 classes, the number of minutes is 66 greater than the number of dollars, and so on.  $132 = 4 \times 33$ , so Randolph must have taken 4 classes.

18. **(D)**. In order to solve this problem, you first need to convert each of the gasoline types into miles/dollar. To do this, you take the miles/gallon and divide it by dollars/gallon. Thus, for regular gasoline, if it gets 20 miles/gallon and

$$\frac{20}{4} = 5$$

each gallon costs \$4.00, then the miles/dollar is 5. Similarly, the miles/dollar of premium gasoline is

$$\frac{25}{6.25} = 4$$

To express this as a percentage, use the equation:

$$\text{Percent Increase} = \frac{\text{Difference}}{\text{Original}} \times 100$$

$$\text{Thus, } \frac{5 - 4}{4} \times 100 = 25\%.$$

19. **(B)**. Profit is equal to Revenue - Expenses. First, calculate revenue:

$$12 \text{ cases sold for } \$220 \text{ each} = \$2,640$$

$$60 \text{ bottles sold for } \$20 \text{ each} = \$1,200$$

TO TA L R EV EN U E = \$3,840

N ow ,calculate expenses.H ow m any total bottles of w ine w ere sold? 12 cases  $\times$  12 bottles,plus 60 individual bottles = 204 bottles.N ote that the bottles sold individually versus those sold in cases have the sam e inventory cost (\$10), but different shipping costs.Thus:

204 bottles at \$10 each = \$2,040

Shipping on bottles =  $60 \times \$5 = \$300$

Shipping on cases =  $12 \times \$40 = \$480$

TO TA L EX PEN SES = \$2,820

Profit = R evenue - Expenses

Profit = \$3,840 - \$2,820

Profit = \$1,020

20.(D ).This is a m axim ization question.To solve m axim ization questions,you often have to m inim ize som ething else.In order to get the m ost people involved here,you need the donation per person to be as sm all as possible.In this case,everyone could pay exactly \$14:

$$237/14 = 16.92$$

Y ou can't round up to 17,because it is not possible that 17 people donated \$14 each (you w ould end up w ith som ething bigger than \$237).The answ er is (D ),or 16.

21.(B ).If one sack of rice is w orth one-third of a m edallion,buying the w hole m edallion w ould require three sacks of rice.Q uantity B is equal to 3.The m ath is a bit tougher in Q uantity A ,but no calculation is really required — if a sack of rice gets you 2.5 chickens,a single chicken is w orth less than a sack of rice.Q uantity A is less than 1.

22.(D ).The lodge has  $20(14) = 280$  “fuel-days” of fuel.(A “fuel-day” is enough fuel for 1 room for 1 day.) If the lodge only needs to heat 15 room s instead of 20,divide 280 by 15 to get 18.666... .Y ou are asked for FU LL days,so round dow n to get 18.

23.(E ).A ssign the variable s for subscribers.

Last year:

\$50 per subscription

s subscribers

This year:

\$60 per subscription

s - 4 subscribers

Y ou are told that the m agazine “could” lose 4 subscribers and that the m agazine w ould then collect the sam e revenue as last year — don't let the “could” throw you off.Y ou are being asked to calculate using this hypothetical situation:

$$50s = 60(s - 4)$$

$$50s = 60s - 240$$

$$-10s = -240$$

$$s = 24$$

**24.III and IV only.** Let's say that Janine buys  $x$  of the first pair of socks and  $y$  of the second. This means that she spends  $3x$  on the first and  $4y$  on the second. You can rephrase the question as follows: if  $3x + 4y = 29$ , what could be the value of  $x + y$ ? (Keep in mind that  $x$  and  $y$  must be integers.)

Consider all multiples of 4 that are less than 29, and find which of those multiples, when subtracted from 29, will leave you with a multiple of 3. Here are all the multiples of 4 under 29: 4, 8, 12, 16, 20, 24, 28. Only 8 and 20 can leave you with a multiple of 3 when subtracted from 29. If Janine spends \$8 on the second brand of socks, she buys 2 pairs. She then has \$21 to spend on the first brand of socks, meaning that she can buy 7 pairs of the first brand. If you add up the pairs of socks, she buys  $2 + 7 = 9$  pairs. If she spends \$20 on the second brand of socks, which gets her 5 pairs, then she has \$9 left to spend on the first brand, at \$3 per pair, which lets her buy 3 pairs. In this scenario she can buy  $3 + 5 = 8$  pairs. The correct answers are 8 and 9 pairs.